ZooKeys 546: 105–124 (2015)
doi: 10.3897/zookeys.546.6138
http://zookeys.pensoft.net

RESEARCH ARTICLE

A peer-reviewed open-access journal
ZooKeys
Launched to accelerate biodiversity research

Butterflies of the Bodoquena Plateau in Brazil (Lepidoptera, Papilionoidea)

Paulo Ricardo Barbosa de Souza[1], Rhainer Guillermo-Ferreira[1,2]

1 *Programa de Pós-graduação em Entomologia e Conservação da Biodiversidade – PPGECB, Universidade Federal da Grande Dourados – UFGD, Rod. Dourados-Itahum Km 12, Cidade Universitária, CEP 79804-970, Dourados, MS, Brazil* **2** *Departamento de Hidrobiologia, Universidade Federal de São Carlos – UFSCar, São Carlos, SP, Brazil*

Corresponding author: *Rhainer Guillermo-Ferreira* (rhainerguillermo@gmail.com)

Academic editor: *C. Peña* | Received 24 July 2015 | Accepted 18 September 2015 | Published 16 December 2015

http://zoobank.org/153CDBD9-B107-43F0-A911-40FD904898EC

Citation: Souza PRB, Guillermo-Ferreira R (2015) Butterflies of the Bodoquena Plateau in Brazil (Lepidoptera, Papilionoidea). ZooKeys 546: 105–124. doi: 10.3897/zookeys.546.6138

Abstract

Butterflies and moths are found in all terrestrial environments and require efforts for a better understanding of its mega-diversity. These taxa have been the subject of several studies involving phylogeny, ecology and environmental impacts. Nevertheless, several areas in the tropics remain unexplored, resulting in gaps in the taxonomic composition and distribution of butterflies in endemic environments. Therefore, a survey of the butterfly fauna of the Bodoquena Plateau in Brazil was conducted. This area consists of tropical Atlantic Forests, with marginal influences of Savannah, Chaco and Pantanal. Sampling was carried out in 20 locations using Van Someren Rydon traps and insect nets between November 2009 and April 2015. Active collection of individuals was conducted from 9:00 to 17:00h, totaling 240 hours of sampling effort. In total, we registered 768 individuals belonging to 146 species of 98 genera, six families and 18 subfamilies. Nymphalidae was the richest family (84 species), followed by Hesperiidae (22 species), Riodinidae (14 species), Pieridae (12) Papilionidae (11 species) and Lycaenidae (five species). We sampled 239 nymphalids in traps, with 48 species, 30 genera, 15 tribes and five subfamilies. The most common species were *Eunica macris* (Godart, 1824), *Dynamine artemisia* (Fabricius, 1793) and *Memphis moruus* (Fabricius, 1775). Therefore, this study contributes to the knowledge of the Neotropical butterfly diversity and distribution, providing 37 new records and supporting the use of wildlife inventories as important tools for the knowledge of tropical forests biodiversity and conservation.

Keywords

Biodiversity inventory, conservation unit, Atlantic Forest

Copyright *P.R.B. de Souza, R. Guillermo-Ferreira.* This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Introduction

Insects occupy a prominent position in biological studies on communities and habitats conservation due to its biodiversity and role in ecological processes (Elton 1973; Janzen 1987; Hölldobler and Wilson 1990; Gaston 1991; Wolda 1992, Groombridge 1992; Kato et al. 1995). Nevertheless, while insects are the most diverse group on the planet, accounting for more than half of the described living organisms, knowledge is still relatively scarce when compared to other groups (Teston and Corseuil 2002).

Butterflies and moths are found in all terrestrial environments and require efforts to better understand its mega-diversity (De Vries 1987). These taxa have been the subject of several studies involving phylogeny, ecology and environmental impacts (Brown Jr. 1996). Furthermore, the group predictably responds to environmental changes because of its microhabitat fidelity, thus facilitating rapid reactions to habitat degradation (Brown Jr. 1996). However, the natural history of most groups is still unknown, what limits conservation acts, since species respond individually to the effects of fragmentation and habitat loss (Summerville et al. 2001).

In Brazil, foreigners made the first studies on butterflies, and the first Brazilian to conduct studies was Adolpho Mabilde, who also was the first to put together a collection of Lepidoptera (Freitas and Marini-Filho 2011). Studies on butterflies were then concentrated in areas of Atlantic and Amazonian forests (Brown Jr. 1996; Uehara-Prado et al. 2004, 2009; Brown Jr. and Freitas 1999), with a few studies concentrating in the areas of Cerrado and semi-deciduous forests (Carneiro et al. 2008). For instance, there are few studies on the biodiversity of the Mato Grosso do Sul State (MS), which exhibits a set of unique endemic environments, such as the Pantanal, the Chaco and the Montaine forests of the Bodoquena Plateau.

The first studies to provide information about the butterfly fauna of MS were by Talbot (1928) and Travassos and Freitas (1941). Brown Jr. (1986) listed more than 1,000 species in a study conducted in the Pantanal region. After this study, others were carried out by Aoki and Sigrist (2006), Boff et al. (2008), Rech et al. (2009), Uehara-Prado (2009), Dolibaina et al. (2010), Aoki et al. (2012) and Bogiani et al. (2012), summing a total number of 291 species for the state. Furthermore, although this region is a priority area for studies of lepidopteran biodiversity (Freitas and Marini-Filho 2011), a large area is still unexplored.

Therefore, this study aimed to assess the diversity of butterflies of the Bodoquena Plateau, which is a conservation priority hotspot with great geological and biogeographical importance, but with insufficient data. The Bodoquena Mountains are part of the ecological corridor of Cerrado-Pantanal biodiversity, belonging to the core area of the endangered Atlantic Forest Reserve and the Pantanal Biospheres. This region has been highly threatened by tourist development and the increasing growth of agricultural practices in adjacent farms (Brazil 2007). The knowledge on the fauna of this region is scarce, except for frogs (Uetanabaro et al. 2007), macroinvertebrates (Escarpinati et al. 2011, 2013; Schulz et al. 2012), ants and wasps (Auko & Silvestre 2013; Silvestre et al. 2012; Silvestre et al. 2014).

Material and methods

Study area

The Serra da Bodoquena National Park (Parque Nacional da Serra da Bodoquena - PNSB) is the only conservation unit in the Mato Grosso do Sul State, located in central Brazil (21°8'2" to 2°38'26"S and 56°48'31" 56°44'28"W) (MMA 2002). It consists of two major geomorphological blocks with different characteristics: one to the north, with an area of 27.793 ha, and another to the south, with 48.688 ha (Figure 1) (Fundação Neotrópica 2002). This conservation unit has 300 km in length and width ranging from 20 to 50 km, and exhibits limestone rocks of the Corumbá Formation (Neoproterozoic III), with altitudes ranging from 450 to 800 meters (PCBAP 1997; Boggiani et al. 2000).

The vegetation is a mix of alluvial semi-deciduous forest (gallery forest), submontane deciduous forest (dry forest), wetlands, pasture and regenerating areas (Françoso et al. 2011). The predominant vegetation type is submontane deciduous forest. With an area of 764,81 km^2, the NBSP covers approximately 0.2% of the surface of MS, which corresponds to 16% of all Atlantic Forest remnants in the state. When considering submontane deciduous seasonal forests alone, more than 25% of its area is located in this protected ecological reserve (Brazil 2007).

Sampling procedures

Sampling was carried out in 20 locations (Table 1) using Van Someren Rydon traps and insect nets between November 2009 and April 2015. Individuals were collected with an insect net, following pre-existing trails along each locality from 9:00 to 17:00 h, totaling 240 hours of sampling effort. Each trail was sampled for 4 hours (~15-20 km), following a zigzag path along the trail. This method allowed us to sample individuals inside the forest, since we sampled along 5 m of each side of the trail. We also used bait traps with fermented banana and sugar cane juice randomly arranged at a height of two meters, with ten traps per location, totaling 200 traps. Traps were set at 10:00 h and removed eight days later at the same period of the day. Voucher specimens are deposited in the Lepidoptera Collection of the Biodiversity Museum (MuBio) of the Federal University of Grande Dourados (UFGD).

The species identification was performed with the aid of specialized bibliography (Brown Jr. 1992, Canals 2000, 2003, Casagrande 1995, D'Abrera 1981, 1987a, b, c, 1988, 1994, 1995, Glassberg 2007) and confirmed by specialists (see acknowledgments). The taxonomical classification follows the proposal of Warren et al. (2009) for Hesperiidae, and Lamas (2004) for other families. To confirm new records for the state, we consulted Talbot (1928), Travassos and Freitas (1941), Brown Jr. (1986), Aoki and Sigrist (2006), Rech et al. (2009), Uehara-Prado (2009), Dolibaina et al. (2010), Aoki et al. (2012) and Bogiani et al. (2012).

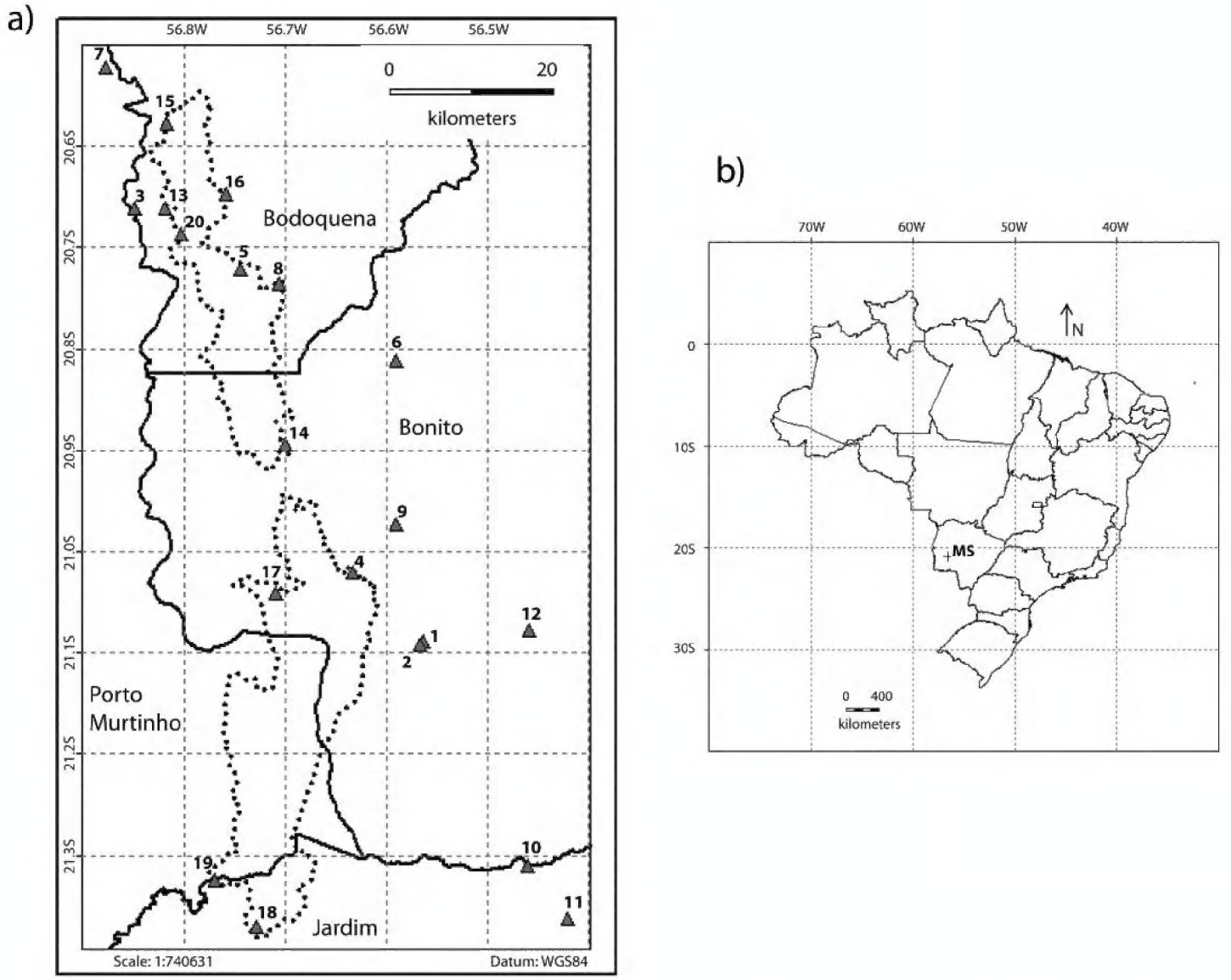

Figure 1. Sampling sites. Maps of the location of sampling sites in the Bodoquena Mountains in the Serra da Bodoquena National Park (**a**), and the location of the Bodoquena Plateau in Brazil (**b**).

The effectiveness of the survey was analyzed with individual and sample-based rarefaction curves (Gotelli and Colwell 2001). Sampling effort (by active collection and traps) and the number of individuals and species collected was utilized to obtain the rarefaction curves. All analyses were made with the EstimateS 9.1.0 software (Colwell et al. 2012). Richness was estimated for 80 and 200 random samples for active and trap sampling respectively, using the second order Jackknife estimator. Results are shown as mean ± SD for observed and estimated richness.

Results and discussion

In total, 768 butterfly individuals were registered, belonging to 146 species in 98 genera, six families in 18 subfamilies (Appendix 1). Nymphalidae was the richest family (82 species), followed by Hesperiidae (22 species), Riodinidae (14 species), Pieridae (12) Papilionidae (11 species) and Lycaenidae (6 species). 239 individuals were sampled in traps, with 48 species of 30 genera, 15 tribes and five subfamilies of Nymphalidae (Table 1). Before this study, 291 species were recorded for MS, from the literature

Table 1. Sampling sites in the Bodoquena Plateau, Mato Grosso do Sul State, Brazil.

Code	Sites	Geographic Coordinates	Height (m)	Sampling Date
1	Palmeirinhas II	21°11'5.57"S, 56°33'25.25"W	341	November 2009
2	Palmeirinhas I	21°11'16.01"S, 56°33'39.71"W	350	November 2009
3	Faz. California	20°42'5.17"S, 56°52'50.27"W	733	November 2009
4	Taquaral	21°06′27"S, 56°38′14"W	569	November 2009
5	As. Canaã	20°46'5.96"S, 56°45'43.09"W	214	November 2009
6	Faz. Pitangueiras	21°52'14"S, 56° 35'19"W	469	November 2009
7	Kadwéu	20°32'41"S, 56°54'44"W	519	November 2009
8	Afluente Salobra	20°47'3.90"S, 56°43'7.37"W	447	November 2009
9	Faz. Morro Alto II	21°01'85.6"S, 56°37'47.6"W	528	November2009
10	Rio da Prata	21°25'58.80"S, 56°26'31.34"W	255	March 2011
11	Buraco das Araras	21°29'37.2"S, 56°23'52.2"W	318	March 2011
12	Hotel Cabanas	21°10'15.44"S, 56°26'24.2"W	276	March 2011
13	Nascente do Gruta	20°42'6.72"S, 56°50'43.79"W	476	March 2011
14	Marambaia	20°57'53.60"S, 56°42'43.90"W	665	December 2013
15	Faz. Sol de Maio	20°36'18.00"S, 56°50'36.40"W	399	February 2013
16	Faz. Rancho Branco	20°41'6.20"S, 56°46'43.70"W	178	December 2013
17	Boqueirão	21°7'51.30"S, 56°43'19.30"W	542	December 2013
18	Santa Fé	21°30'5.32"S, 56°44'37.49"W	485	June 2013 February 2014
19	Ponte Rio Perdido	21°26'59.18"S, 56°47'28.01"W	422	February 2014
20	Ouro Verde	20°43'49.84"S, 56°49'43.98"W	487	March 2011

and museum collections (Talbot 1928, Travassos and Freitas 1941, Brown 1986, Aoki and Sigrist 2006, Rech et al. 2009, Uehara-Prado 2009, Dolibaina et al. 2010, Aoki et al. 2012, Bogiani et al. 2012). Here, we provide 37 new records for MS (Appendix 1), summing 328 species for the State.

The richest subfamilies were Satyrinae (26 espécies), Biblidinae (24 species), Pyrginae (12 species) and Nymphalinae (10 species). Most new records are represented by rare species with few individuals and low frequency. The most common species were *Eunica macris* (Godart, 1824), *Dynamine artemisia* (Fabricius, 1793) and *Memphis moruus* (Fabricius, 1775). The estimated richness for the Bodoquena Mountains was 83 species for the traps and 142 species for the active collection, while the observed richness was 60 species for the traps and 85 species for the active. Therefore, the results suggest that approximately 72.3% and 59.8% of the species richness of the region were collected with traps and active collection, respectively (Fig. 2). These results indicate that, although traps were more efficient, more species were collected with insect nets. Nevertheless, the rarefaction curves show that the lepidopteran richness in the Bodoquena Plateau may be greater that what we observed in this study.

Half of the listed species, (52.05% - 76 species) of the butterfly fauna consists of species with records in areas of Cerrado (Brown Jr. and Mielke 1967a, b) and 56.16% (82 species) from the Atlantic Forest (Brown Jr. and Freitas 2000). The vegetation mo-

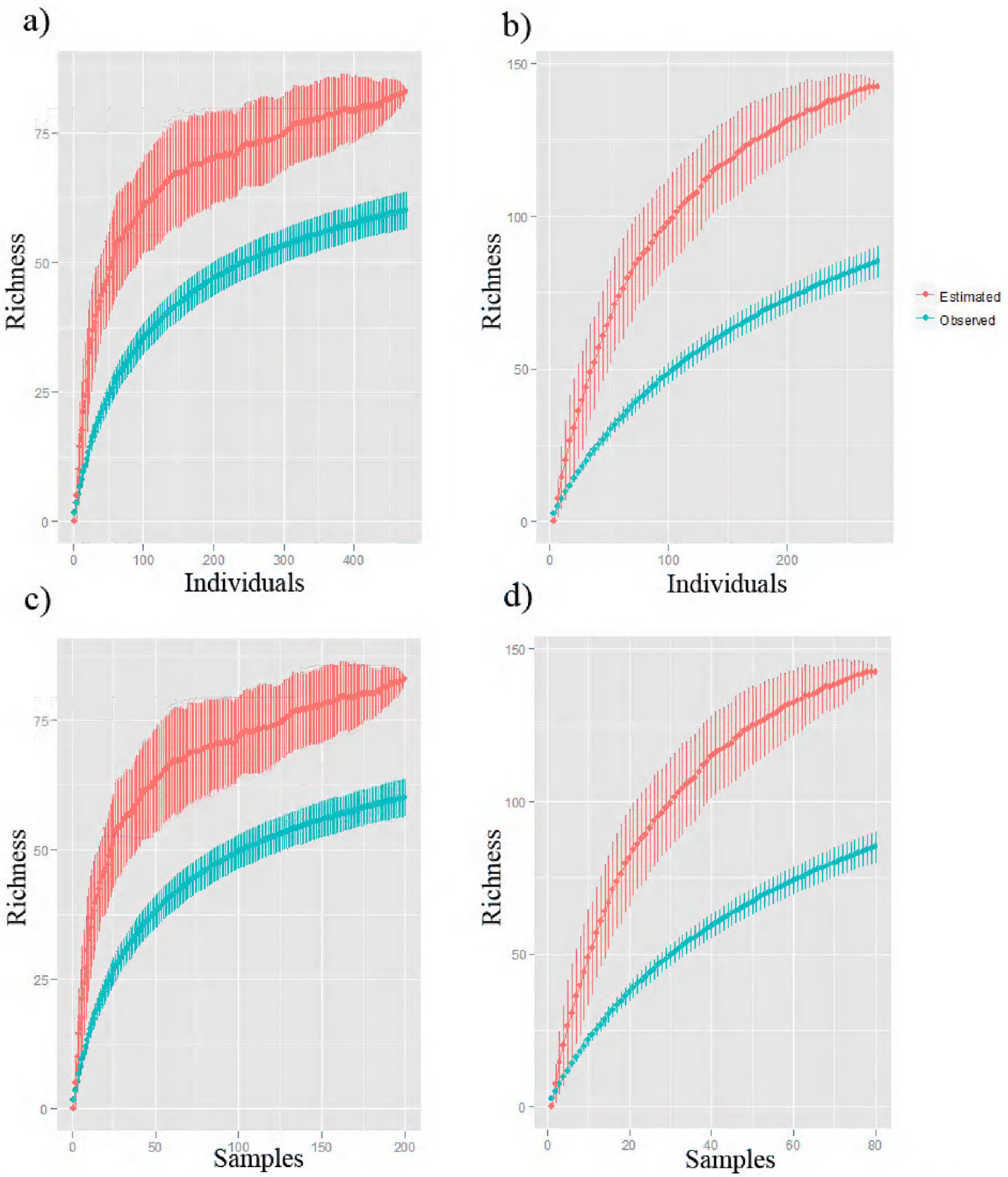

Figure 2. Butterfly richness in the Bodoquena Mountains. Observed and estimated richness of butterflies of the Bodoquena Plateau for both traps (**a, c**) and active collecting (**b, d**), in function of the number of individuals (**a, b**) and sampling effort (**c, d**).

saic found in the SBNP can explain this significant number of shared species among biomes. Most species recorded in the Bodoquena Plateau have a wide geographic distribution in Brazil, a fact evidenced in other studies conducted in the Cerrado (Brown Jr. and Mielke 1967a, b). Nevertheless, some rare species were found, such as *Leucochimona icare* (Hübner, [1819]) (Figure 3a, b), *Strymon mulucha* (Hewitson, 1867) (Figure 3d) and *Catocyclotis aemulius* (Fabricius, 1793) (Figure 3e, f). Moreover, two

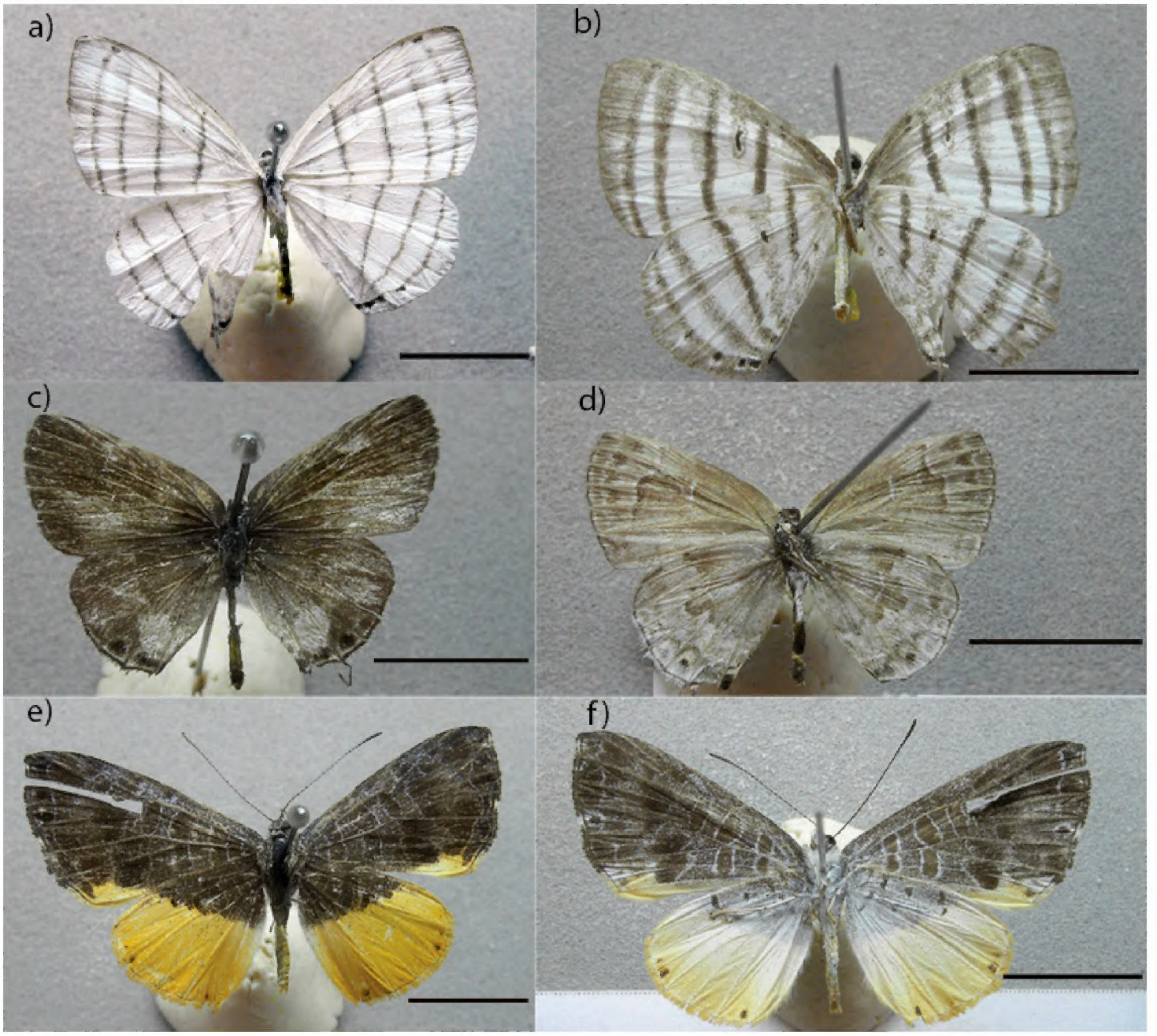

Figure 3. Rare species collected in the Bodoquena Mountains. *Leucochimona icare* (Hübner, [1819]) (**a, b**), *Strymon mulucha* (Hewitson, 1867) (**c, d**) and *Catocyclotis aemulius* (Fabricius, 1793) (**e, f**). Scale bars .....

new species of *Moneuptychia* (Nymphalidae) were found and are being described (André V. L. Freitas pers. comm.).

The percentage of 8.27% for Hesperiidae collected in the Bodoquena Plateau, are not in agreement with results of other inventories carried out in the Atlantic Forest (Mielke 1994; Carneiro et al. 2008; Dolibaina et al. 2011), in which hesperiids are usually more common. The Hesperiidae sub-sampling is common in butterflies inventories (Bonfantti et al. 2009; Vasconcelos et al. 2009; Ritter et al. 2011; Zacca and Bravo 2012), especially by their small size, cryptic color patterns and inefficient attraction by fermented fruit lures, thus hindering their collection (Brown Jr. and Freitas 1999; Caldas and Robbins 2003; Zacca and Bravo 2012). In this context, subsampling may be derived from different methodologies and approaches of each one of these studies, besides familiarity of the collector with each taxon.

Brown Jr. (1972) discusses and tests the methods used by Ebert (1970) in which the author shows that supplementation of methodologies, proper maintenance of re-

cords, performance of several collectors at the same time and knowledge about the behavior of groups guarantee a more complete and representative record of these species. Pinheiro-Machado and Silveira (2006) show that the mentioned method may vary according to the location and logistics, but the best results in number of species are achieved when various methods are employed.

Nymphalidae was the family with highest diversity independent of methodology. This result was expected since this is butterfly family with most species (De Vries 1987), as recorded in the studies by Iserhard and Romanowski (2004), Marchiori and Romanowski (2006), Sackis and Morais (2008), Iserhard et al. (2010) and Rosa et al. (2011) conducted in the state of Rio Grande do Sul. However, Brown Jr. and Freitas (2000) compiled records that resulted in more than 2,100 butterfly species in the Atlantic Forest. According to these authors, in Brazil, the Family Hesperiidae, Nymphalidae and Lycaenidae are the richest in species, followed by Riodinidae, Pieridae, and Papilionidae.

In this study, 32.19% of the species showed were singletons. In the study conducted by Dessuy and Morais (2007) in a forest fragment of Santa Maria, 26% of species collected were singletons, whereas in Sackis (2008) study, it represents 36% of the species. According Dessuy and Morais (2007) singletons are species that live in the habitat in which they are sampled and can be very difficult to find as it keeps in small populations. In addition, these species may be considered rare in one spot, but not in others, due to differences in the availability of food resources, host plants or microclimatic factors (Brown Jr. and Freitas 2003).

The results obtained in this study represent the only information on the butterfly species composition of the Bodoquena Plateau, an area considered of utmost priority for biodiversity conservation. Interestingly, 44.5% of the whole butterfly fauna of MS can be found in the Bodoquena Mountains, showing its great importance for population maintenance and butterfly conservation. Furthermore, the records of rare and new species add evidence to the role of large ecological reserves and conservation areas, as well as the importance of taxonomical surveys. Therefore, this study contributed to the knowledge on Neotropical butterfly species diversity and distribution, providing new records and supporting the use of wildlife inventories as important tools for the knowledge of tropical forests biodiversity and conservation.

Acknowledgements

We are extremely gateful to Marcio Uehara-Prado, Eduardo de Proenca Barbosa, Ricardo Russo Siwert, Lucas Augusto Kaminski, Danilo Bandini Ribeiro and André Victor Lucci Freitas for insect identification confirmations. We would like to thank Manoel Araécio-Uchoa Fernandes for logistic support, the National Counsel of Technological and Scientific Development (CNPq, Process 476484/28-1) for funding, and the Coordination for the Improvement of Higher Education Personnel (CAPES) for a grant to PRBS. RGF thank CAPES, CNPq and FAPESP for constant financial support.

References

Aoki C, Sigrist MR (2006) Inventário dos Visitantes Florais no Complexo Aporé-Sucuriú. In: Pagotto TCS, Souza PR (Eds) Biodiversidade do Complexo Aporé-Sucuriú, Subsídios à Conservação e Manejo do Cerrado. Editora UFMS, 145–162.

Aoki C, Pires ACV, Sousa DLH, Teixeira-Gamarra MC (2012) Borboletas da Reserva Particular do Patrimônio Natural Engenheiro Eliezer Batista. In: Rabelo APC, Moreira VF, Bertassoni A, Aoki C (Eds) Descobrindo o Paraíso: Aspectos Biológicos da Reserva Particular do Patrimônio Natural Engenheiro Eliezer Batista, 162–181.

Auko TH, Silvestre R (2013) Composição faunística de vespas (Hymenoptera: Vespoidea) na floresta estacional do Parque Nacional da Serra da Bodoquena, Brasil. Biota Neotropica 13: 292–299. doi: 10.1590/S1676-06032013000100028

Boff S, Graciolli G, Boaretto AG, Marques MR (2008) Insetos visitantes de gomas exsudadas por Terminalia argentea Mat & Zucc (Combretaceae). Revista Brasileira de Entomologia 52(3): 477–479. doi: 10.1590/S0085-56262008000300025

Bogiani PA, Aranda R, Machado COF (2012) Riqueza de borboletas (Lepidoptera) em um fragmento urbano de Cerrado em Mato Grosso do Sul, Brasil. EntomoBrasilis 5(2): 93–98. doi: 10.12741/ebrasilis.v5i2.204

Boggiani PC, Coimbra AM, Gesicki ALD, Sial AN, Ferreira VP, Ribeiro FB, Flexor JM (2000) Tufas Calcárias da Serra da Bodoquena. In: Schobbenhau C, Campos D, Queiroz ET, Winge M, Berbert-Born M (Eds) Indicative List of Geological Sites – GILGES-UNESCO, 249–259.

Bonfantti D, Mare RA, Giovenardi R (2009) Butterflies (Lepidoptera: Papilionoidea and Hesperioidea) from two forest fragments in northern Rio Grande do Sul. Check List 5(4): 819–829. http://www.checklist.org.br/getpdf?SL035-09

Ministério do Meio Ambiente (2007) Biodiversidade brasileira: avaliação e identificação de ações prioritárias para a conservação, utilização sustentável e repartição dos benefícios da biodiversidade Brasileira. Secretaria de Biodiversidade e Florestas, Brasília. http://mma.gov.br [accessed 21 June 2015]

Brown Jr KS (1972) Maximizing daily butterfly counts. Journal of the Lepidopterists' Society 26(3): 183–196.

Brown Jr KS (1986) Zoogeografia da região do Pantanal Matogrossense. In: I Simpósio Sobre Recursos Naturais e Sócio-Econônicos do Pantanal, Corumbá, MS. Anais do 1º. Simpósio sobre Recursos Naturais e Sócio-econômicos do Pantanal (Corumbá, Mato Grosso). Embrapa, 137–178.

Brown Jr KS (1992) Borboletas da Serra do Japi: diversidade, hábitats, recursos alimentares e variação temporal. In: Morellato LP (Ed.) História natural da Serra do Japi: Ecologia e preservação de uma área florestal no Sudeste do Brasil. Editora da UNICAMP, São Paulo, 142–187.

Brown Jr KS (1996) The use of insects in the study, inventory, conservation and monitoring of biological diversity in the Neotropics, in relation to land use models. In: Ae SA, Hirowatari T, Ishii M, Brower LP (Eds) Decline and Conservation of Butterflies in Japan, III. Lepidopterological Society of Japan, Osaka, 128–149. http://www.cbd.int [21.11.2011]

Brown Jr KS, Freitas AVL (1999) Lepidoptera. In: Brandão CRF, Cancello EM (Eds) Biodiversidade do Estado de São Paulo: síntese do conhecimento ao final do século XX. Vol. 5. Invertebrados terrestres. Fapesp, São Paulo, 225–243.

Brown Jr KS, Freitas AVL (2000) Diversidade de Lepidoptera em Santa Teresa, Espírito Santo. Boletim do Museu de Biologia Mello Leitão 11(12): 71–118.

Brown Jr KS, Freitas AVL (2003) Butterfly Communities of Urban Forest Fragments in Campinas, São Paulo, Brazil: Structure, Instability, Environmental Correlates, and Conservation. Journal of Insect Conservation, Dordrecht 6(4): 217–231. doi: 10.1023/A:1024462523826

Brown Jr KS, Mielke OHH (1967a) Lepidoptera of the Central Brazil Plateau. I. Preliminary list of Rophalocera: Introduction, Nymphalidae and Libytheidae. Journal of the Lepidopterists' Society 21(2): 77–106.

Brown Jr KS, Mielke OHH (1967b) Lepidoptera of the Central Brazil Plateau. I. Preliminary list of Rophalocera (continued): Lycaenidae, Pieridae, Papilionidae and Hesperiidae. Journal of the Lepidopterists' Society 21(3): 145–168.

Caldas A, Robins RK (2003) Modified Pollard transects for assessing tropical butterfly abundance and diversity. Biological Conservation 110: 211–219. doi: 10.1016/S0006-3207(02)00190-8

Canals GR (2000) Butterflies of Buenos Aires. LOLA, Buenos Aires, 347 pp.

Canals GR (2003) Mariposas de Missiones. LOLA, Buenos Aires, 492 pp. doi: 10.1016/S0006-3207(02)00190-8

Carneiro ES, Mielke OHH, Casarande MM (2008) Inventário de Borboletas no Brasil: estado da arte e modelo de áreas prioritárias para pesquisa com vistas à conservação. Natureza & Conservação 6(2): 68–90.

Casagrande MM (1995) Notas sistemáticas sobre Brassolinae: I. Tribos Lepidoptera, Nymphalidae). Revista Brasileira de Zoologia 12(3): 671–699. doi: 10.1590/S0101-81751995000300023

Colwell RK, Chao A, Gotelli NJ, Lin SY, Mao CX, Chazdon RL, Longino JT (2012) Models and estimators linking individual-based and sample-based rarefaction, extrapolation, and comparison of assemblages. Journal of Plant Ecology 5: 3–21. doi: 10.1093/jpe/rtr044

D'Abrera B (1981) Butterflies of the Neotropical region. Part I. Papilionidae & Pieridae. Landsowne, Melbourne, 172 pp.

D'Abrera B (1987a) Butterflies of the Neotropical region. Part II. Danaidae, Ithomiidae, Heliconiidae & Morphidae. Hill House, Victoria, 174–384.

D'Abrera B (1987b) Butterflies of the Neotropical region. Part III. Brassolidae, Acraeidae & Nymphalidae (partim). Hill House, Victoria, 386–525.

D'Abrera B (1987c) Butterflies of the Neotropical region. Part IV. Nymphalidae (partim). Hill House, Victoria, 528–678.

D'Abrera B (1988) Butterflies of the Neotropical region. Part V. Nymphalidae (Conc.), Satyridae. Hill House, Victoria, 680–877.

D'Abrera B (1994) Butterflies of the Neotropical region. Part VI. Riodinidae. Hill House, Victoria, 880–1096.

D'Abrera B (1995) Butterflies of the Neotropical region. Part VII. Lycaenidae. Hill House, Victoria, 1098–1270.

De Vries PJ (1987) The butterflies of Costa Rica and their natural history -Papilionidae, Pieridae, Nymphalidae. Princeton University Press, Princeton, 327 pp.

Dessuy MB, Morais ABB (2007) Diversidade de borboletas (Lepidoptera: Papilionoidea e Hesperioidea) em fragmentos de floresta estacional decidual em Santa Maria, Rio Grande do Sul, Brasil. Revista Brasileira de Zoologia 24(1): 108–120. doi: 10.1590/S0101-81752007000100014

Dolibaina DR, Dias FMS, Uehara-Prado M, Mielke OHH, Casagrande MM (2010) Insecta, Lepidoptera, Riodinidae, Nymphidiini, Aricoris terias (Godman, 1903): First records from Brazil and updated geographic distribution map. Check List 6: 637–638.

Dolibaina DR, Mielke OHH, Casagrande MM (2011) Borboletas (Papilionoidea e Hesperioidea) de Guarapuava e arredores, Paraná, Brasil: um inventÃ rio com base em 63 anos de registros. Biota Neotropica 11: 341–354. doi: 10.1590/s1676-06032011000100031

Ebert H (1970) On the frequency of butterflies in eastern Brazil, with a list of the butterfly fauna of Poços de Caldas, Minas Gerais. Journal of the Lepidopterologist Society 23(S3): 1–47.

Elton CS (1973) The structure of invertebrate populations inside neotropical rainforest. Journal Animal Ecology 42(1): 55–104. doi: 10.2307/3406

Escarpinati SC, Roque FO, Medina-Jr PB, Raizer J (2011) Macroinvertebrate community in recreational areas in a karst river (Bonito, Brazil): implications for biomonitoring of tourist activities. Tourism and Karst Areas 4(2): 121–130.

Escarpinati SC, Siqueira T, Medina Jr P, Roque FO (2013) Short-term effects of visitor trampling on macroinvertebrates in karst streams in an ecotourism region. Environmental Monitoring and Assessment 186(3): 1655–1663. doi: 10.1007/s10661-013-3483-x

Fundação Neotrópica (2002) Plano de Ecodesenvolvimento no entorno do Parque Nacional da Serra da Bodoquena. Fundação Neotrópica do Brasil, Relatório Técnico, 13.

Françoso RD, Brandão RA, Batista VBGV (2011) Recognition of conservation importante áreas based on biological indicators: supports to the zoning of two national parks in the brazilian cerrado. Caminhos de Geografia 12(40): 106–118.

Freitas AVL, Marini Filho OJ (2011) Plano de ação nacional para a conservação dos lepidópteros ameaçados de extinção. ICMBio, Brasilia, 124 pp.

Gaston KJ (1991) The magnitude of global insect species richness. Conservation Biology 5(3): 283–296. doi: 10.1111/j.1523-1739.1991.tb00140.x

Glassberg J (2007) A swift guide to the butterflies of Mexico and Central America. Sunstreak Books Inc, 199 pp.

Gotelli NJ, Colwell RK (2001) Quantifying biodiversity: procedures and pitfalls in the measurement and comparison of species richness. Ecology Letters 4: 379–391. doi: 10.1046/j.1461-0248.2001.00230.x

Groombridge B (1992) Global biodiversity. Chapman & Hall, London. doi: 10.1007/978-94-011-2282-5

Hölldobler B, Wilson EO (1990) The ants. The Belknap Press of Havard University Press, Massachusets, 733 pp. doi: 10.1007/978-3-662-10306-7

Iserhard CA, Romanowski HP (2004) Lista de espécies de borboletas (Lepidoptera: Papilionoidea & Hesperioidea) da região do vale do Rio Maquine, Rio Grande do Sul, Brasil. Revista Brasileira de Zoologia 21(3): 649–662. doi: 10.1590/S0101-81752004000300027

Iserhard CA, Quadros MT, Romanowski HP, Mendonça Junior MS (2010) Borboletas (Lepidoptera: Papilionoidea e Hesperioidea) ocorrentes em diferentes ambientes na floresta ombrófila mista e nos campos de cima da Serra do Rio Grande do Sul, Brasil. Biota Neotropica 10(1): 309–320. doi: 10.1590/S1676-06032010000100026

Janzen DH (1987) Insect diversity of a Costa Rica dry forest; why keep it, and how? Biological Journal of the Linnean Society 30(4): 343–356. doi: 10.1111/j.1095-8312.1987.tb00307.x

Kato M, Inoue T, Hamid AA, Nagamitsu T, Merdek MB, Nona AR, Itino T, Yamane S, Yumoto T (1995) Seasonality and vertical structure of light-attracted insect communities in a Dipterocarp Forest in Sarawak. Researches on Population Ecology 37(1): 59–79. doi: 10.1007/BF02515762

Lamas G (2004) Checklist: Part 4A. Hesperioidea – Papilionoidea. In: Heppner JB (Ed.) Atlas of Neotropical Lepidoptera. Association for Tropical Lepidoptera, Inc. Scientific Publishers, 439 pp.

Marchiori MO, Romanowski HP (2006) Borboletas (Lepidoptera, Papilionoidea e Hesperioidea) do Parque Estadual do Espinilho e entorno, Rio Grande do Sul, Brasil. Revista Brasileira de Zoologia 23(4): 1029–1037. doi: 10.1590/S0101-81752006000400007

Ministério do Meio Ambiente/SBF (2002) Avaliação e identificação de áreas e ações prioritárias para a conservação, utilização sustentável e repartição dos benefícios da biodiversidade dos biomas brasileiros. Brasília, 44 pp.

Mielke OHH, Schröder H (1994) Die Typen Und Typoide Des Naturmuseum Senckenberg, 82: Insecta: Lepidoptera: Hesperiidae Von M. Draudt Aus Der Neotropis Beschriebenen Arten.. Senckenbergiana Biologica, Frankfurt, Alemanha 73(1–2): 135–158.

PCBAP (1997) Plano de Conservação da Bacia do Alto Paraguai (Pantanal). Análise integrada e prognóstica da Bacia do Alto Paraguai, Brasil. Ministério do Meio Ambiente, dos Recursos Hídricos e da Amazônia Legal, Brasília.

Pinheiro-Machado C, Silveira FA (2006) Surveying and monitoring of pollinators in natural landscapes and in cultivated fields. In: Fonseca VLI, Saraiva AM, Jong DD (Eds) Bees as pollinators in Brazil: assessing the status and suggesting best practices. Holos, Ribeirão Preto, 96 pp.

Rech AR, Rosa YBCJ, Rosa Junior EJ (2009) Herbivore behavior of Hyphilaria thasus Stoll. 1780 (Lepidoptera: Riodinidae) in fruit and seeds of Brassavola cebolleta and Oncidium jonesianum (Orchidaceae) in Mato Grosso do Sul, Brazil. Revista Brasileira de Horticultura Ornamental 14(2): 209–211.

Ritter CD, Lemes R, Morais ABB, Dambros CS (2011) Borboletas (Lepidoptera: Hesperioidea e Papilionoidea) de fragmentos de Floresta Ombrófila Mista, Rio Grande do Sul, Brasil. Biota Neotropica 11(1): 361–368. http://www.biotaneotropica.org.br/v11n1/pt/abstract?inventory+bn00511012011

Rosa PLP, Chiva EQ, Iserhard CA (2011) Borboletas (Lepidoptera: Papilionoidea e Hesperioidea) do sudoeste do pampa brasileiro, Uruguaiana, Rio Grande do Sul, Brasil. Biota Neotropica 11(1): 355–360. doi: 10.1590/S1676-06032011000100032

Sackis GD, Morais ABB (2008) Borboletas (Lepidoptera: Hesperioidea e Papilionoidea) do campus da Universidade Federal de Santa Maria, Santa Maria, Rio Grande do Sul. Biota Neotropica 8(1): 151–158. doi: 10.1590/S1676-06032008000100018

Schulz G, Siqueira T, Stefan G, Roque FO (2012) Passive and active dispersers respond similarly to environmental and spatial processes: an example from metacommunity dynamics of tree hole invertebrates. Fundamental Applied Limnology 181(4): 315–326. doi: 10.1127/1863-9135/2012/0365

Silvestre R, Demétrio MF, Delabie JHC (2012) Community Structure of Leaf-Litter Ants in a Neotropical Dry Forest: A Biogeographic Approach to Explain Betadiversity. Psyche 2012: 1–15. doi: 10.1155/2012/306925

Silvestre R, Demétrio MF, Trad BM, Lima FVO, Auko TH, Souza PR (2014) Diversity and Distribution of Hymenoptera Aculeata in Midwestern Brazilian Dry Forests. In: Greer FE (Ed.) Dry Forests: Ecology, Species Diversity and Sustainable Management. Editora NOVA, 29–79.

Summerville KS, Metzler EH, Crist TO (2001) Diversity of Lepidoptera in Ohio Forests at local and regional scales: how heterogeneous is the fauna? Annals of the Entomological Society of America 94(4): 583–591. doi: 10.1603/0013-8746(2001)094[0583:DOLIOF]2.0.CO;2

Talbot G (1928) List of Rhopalocera collected by MR. C. L. Collenette in Matto Grosso, Brazil. Bulletin of the Hill Museum 2(3): 192–220.

Travassos L, Freitas JFT (1941) Relatório da excursão científica realizada na zona da Estrada de Ferro Noroeste do Brasil em Julho de 1939. Memórias do Instituto Oswaldo Cruz 35(3): 525–556.

Teston JA, Corseuil E (2002) Ninfalídeos (Lepidoptera, Nymphalidae) ocorrentes no Rio Grande do Sul. Brasil. Parte II. Brassolinae e Morphinae. Biociências. Porto Alegre 10(1): 75–84.

Uehara-Prado M, Freitas AVL, Francini RB, Brown Jr KS (2004) Guia das borboletas frugívoras da Reserva Estadual do Morro Grande e região de Caucaia do Alto, Cotia (SP). Biota Neotropica 4(1): 1–25. doi: 10.1590/S1676-06032004000100007

Uehara-Prado M, Fernandes JO, Bello AM, Machado G, Santos AJ, Vaz-de-Mello FZ, Freitas AVL (2009) Selecting terrestrial arthropods as indicators of small-scale disturbance: A first approach in the Brazilian Atlantic Forest. Biological Conservation 142(6): 122–1228. doi: 10.1016/j.biocon.2009.01.008

Uehara-Prado M (2009) Diversidade e Composição de Borboletas Frugívoras em cerradão e plantio de eucalipto em Três Lagoas, Mato Grosso do Sul, Brasil. Anais do III Congresso Latino Americano de Ecologia, São Lourenço –MG.

Uetanabaro M, Souza FL, Landgref Filho P, Beda AF, Brandão RA (2007) Anfíbios e répteis do Parque Nacional da Serra da Bodoquena, Mato Grosso do Sul, Brasil. Biota Neotropica 7(3): 279–289. doi: 10.1590/S1676-06032007000300030

Vasconcelos RN, Barbosa ECC, Peres MCL (2009) Borboletas do Parque Metropolitano de Pituaçu, Salvador, Bahia, Brasil. Sitientibus Série Ciências Biológicas 9(2–3): 158–164.

Warren AD, Ogawa JR, Brower AVZ (2009) Revised classification of the family Hesperiidae (Lepidoptera: Hesperioidea) based on combined molecular and morphological data. Systematic Entomology 34(3): 467–523. doi: 10.1111/j.1365-3113.2008.00463.x

Wolda H (1992) Trends in abundance of tropical forest insects. Oecologia 89(1): 47–52. doi: 10.1007/BF00319014

Zacca T, Bravo F (2012) Borboletas (Lepidoptera: Papilionoidea e Hesperioidea) da porção norte da Chapada Diamantina, Bahia, Brasil. Biota Neotropica 12(2): 117–126. doi: 10.1590/S1676-06032012000200012

Appendix 1. Butterfly species list for the Serra da Bodoquena National Park, including 20 occurrence sites (represented by codes, see Table 1). Taxa are presented according to family and subfamily. ♦: New records for the Mato Grosso do Sul State; * New species.

Family	Subfamily	Tribe	Species	Abundance	Occurrence site (codes)			
					Bonito	Bodoquena	Jardim	Porto Murtinho
Nymphalidae (N = 82)	Libytheinae		*Libytheana carinenta* (Cramer, 1777)	1			18	
	Apaturinae		*Doxocopa agathina* (Cramer, 1777)	14	4,14,17	13	18	
			Doxocopa linda nitoris Fruhstorfer, 1907 ♦	11	4		18	
	Biblidinae	Biblidini	*Biblis hyperia* (Cramer, 1779)	16	4,14	13	18	
		Callicorini	*Callicore pygas* (Godart, [1824])	6	4		11,18	
			Callicore sorana (Godart, [1824])	1			11	
			Haematera pyrame (Hübner, [1819]) ♦	7	6,9	16	18	
		Eubagini	*Dynamine* sp.	4	2,4,9	8		
			Dynamine aerata (Butler, 1877) ♦	11	4,9			
			Dynamine agacles (Dalman, 1823)	1	9			
			Dynamine artemisia (Fabricius, 1793)	50	2,4,9,14,17	3,5,15		
			Dynamine coenus (Fabricius, 1793)	1			18	
			Dynamine postverta (Cramer, 1779)	9	4,9,14		18	
			Dynamine postverta postverta (Cramer, 1779)	9	2,4		18	
		Catonephelini	*Eunica macris* (Godart, [1824]) ♦	25	4,6,14	3,5,13,16	18,19	
			Eunica margarita (Godart, [1824]) ♦	1	12			
			Eunica tatila (Herrich-Schäffer, [1855])	20	4,14		18, 19	
			Eunica bechina (Hewitson, 1852)	2	14		18	
		Ageroniini	*Hamadryas amphinome* (Linnaeus, 1767)	2			18,19	
			Hamadryas arete (Doubleday, 1847)	1	4			
			Hamadryas chloe (Stoll, 1787)	1	14	12	18	
			Hamadryas epinome (Felder & Felder, 1867)	15	4,9,14	13	11,18	
			Hamadryas februa (Hübner, [1823])	21	4,6,12	3,20	11,18	7
			Hamadryas feronia (Linnaeus, 1758)	1			11	
			Hamadryas iphthime (Bates, 1864) ♦	4	4		10	
		Epiphelini	*Nica flavilla* (Godart, [1824])	2	6,12			

Family	Subfamily	Tribe	Species	Abundance	Occurrence site (codes)			
					Bonito	Bodoquena	Jardim	Porto Murtinho
			Temenis laothoe (Cramer, 1777)	7	1,9	20	10,18,19	
	Cyrestinae	Cyrestini	*Marpesia chiron* (Fabricius, 1775)	11	4,14,17	3, 16	18	
			Marpesia petreus (Cramer, 1776)	1	14			
			Fountainea ryphea (Cramer, 1775)	5	12		18	
			Memphis acidalia (Hübner, [1819])♦	5	1,2,14	8		
			Memphis moruus (Fabricius, 1775)	33	1,4,12,14, 17	8	11,18	
			Zaretis isidora (Cramer, 1779)	17	1,4,14	3,130	18,19	
		Preponini	*Archaeoprepona demophon* (Linnaeus, 1758)	6	1,2,4,12		18	
			Prepona pylene Hewitson, [1854] ♦	1	4			
	Heliconiinae	Heliconiini	*Heliconius erato phyllis* (Fabricius, 1775)	3	4	16		
			Dryas iulia (Fabricius, 1775)	1		16		
			Dryadula phaetusa (Linnaeus, 1758)	1		13		
			Agraulis vanillae maculosa (Stichel, [1908])	1			11	
	Danainae	Ithomiini	*Thyridia psidii* Linnaeus, 1758 ♦	1	17			
		Danaini	*Lycorea halia pales* Felder & Felder, 1862	2		15		
			Tithorea harmonia (Cramer, 1777)	1	6			
	Limenitidinae	Limenitidini	*Adelpha iphicleola leucates* Fruhstorfer, 1915	6	14,17		18	
			Adelpha malea (Felder & Felder, 1861) ♦	1			18	
	Nymphalinae	Nymphalini	*Colobura dirce* (Linnaeus, 1758)	7	1,2,4,12,14	8		
			Historis odius (Fabricius, 1775)	1	4			
			Smyrna blomfildia (Fabricius, 1781)	54	4,14		18	
		Victorinini	*Siproeta stelenes* (Linnaeus, 1758)	14	4,14		18	
			Anartia jatrophae (Linnaeus, 1763)	5	6,12		11,18	
		Melitaeini	*Chlosyne lacinia saundersi* (Doubleday, [1847])	5	6	13	11,18	
			Ortilia ithra (Kirby, 1900)	5	9,17	5		
			Ortilia orthia (Hewitson, 1864) ♦	2	1			
			Tegosa claudina (Eschscholtz, 1821)	8	4, 14	3,5,16		
		Junoniini	*Junonia evarete* (Cramer, 1779)	2			18	

Family	Subfamily	Tribe	Species	Abundance	Occurrence site (codes)			
					Bonito	Bodoquena	Jardim	Porto Murtinho
	Satyrinae	Satyrini	*Cissia terrestris* (Butler, 1867)	8	1,2,4		18	
			Hermeuptychia sp.	3	14		19	
			Magneuptychia ocnus (Butler, 1867) ♦	2	2,4			
			Manataria hercyna (Hübner, [1821]) ♦	1	14			
			Moneuptychia sp.* ♦	6	4,14		18	
			Moneuptychia sp.2* ♦	3	14		18	
			Pareuptychia ocirrhoe (Fabricius, 1776)	4	2,9		18	
			Pareuptychia ocirrhoe interjecta (D'Almeida, 1952)	3	2,12			
			Pareuptychia summandosa (Gosse, 1880) ♦	3	1, 14			
			Paryphthimoides grimon (Godart, [1824]) ♦	1	14			
			Paryphthimoides phronius (Godart, [1824])	9	1,6,9,14	20	18,19	
			Paryphthimoides poltys (Prittwitz, 1865)	14	1,4,9,14	20	18,19	
			Posttaygetis penelea (Cramer, [1777])	4	1,2,6		18	
			Taygetina kerea (Butler, 1869)	6	2	8,15		
			Taygetis sp.	5	1,14	8		
			Taygetis laches Fabricius, 1793	7	4	8	18,19	
			Taygetis larua Felder & Felder, 1867 ♦	2	1			
			Taygetis mermeria (Cramer, 1776) ♦	1		15		
			Taygetis rufomarginata Staudinger, 1888	1		8		
			Taygetis sylvia Bates, 1866 ♦	1		8		
			Taygetis tripunctata Weymer, 1907 ♦	1		8		
			Taygetis virgilia (Cramer, [1776])	5	4,12		18	
			Yphthimoides celmis (Godart, [1824]) ♦	1	9			
		Brassolini	*Caligo illioneus* (Cramer, 1775) ♦	2	4		10	
			Catoblepia berecynthia (Cramer, 1777) ♦	5	1,2,4	7		
			Eryphanis reevesii (Doubleday, [1849]) ♦	3	12		10,18	
			Opsiphanes invirae (Hübner, [1808])	8	4,14		18	
		Morphini	*Morpho helenor* (Cramer, 1776)	21	4,12	15,20	10,19	

Family	Subfamily	Tribe	Species	Abundance	Occurrence site (codes)			
					Bonito	Bodoquena	Jardim	Porto Murtinho
Papilionidae (N = 11)	**Papilioninae**	**Leptocircini**	*Protesilaus* sp.	1		16		
		Papilionini	*Heraclides hectorides* (Esper, 1784) ♦	3		15	18	
			Heraclides anchisiades (Esper, 1788)	4	6,9	16		
			Heraclides isidorus (Doubleday, 1846) ♦	1	14			
			Heraclides androgeus (Cramer, 1775) ♦	2		16		
			Heraclides astyalus astyalus (Godart, 1819)	2		16		
			Heraclides thoas brasiliensis (Rothschild & Jordan, 1906)	2	1	3		
Hesperiidae (N = 22)		**Troidini**	*Battus polydamas polydamas* (Linnaeus, 1758)	1	17			
			Battus crassus (Cramer, 1777)	1		16		
			Parides lysander mattogrossensis (Talbot, 1928)	2	1,4			
			Parides neophilus (Geyer, 1837) ♦	2	1		19	
			Hesperiidae sp.	7	1	16		
			Hesperiidae sp. 1	2	1,6			
			Hesperiidae sp. 2	3	1,6	16		
			Hesperiidae sp. 3	4	1,6	16	18	
			Hesperiidae sp. 4	1			18	
			Hesperiidae sp. 5	1			18	
	Eudaminae		*Urbanus* sp.	2	4		18	
			Urbanus dorantes (Stoll, 1790)	1	6			
			Urbanus teleus (Hübner, 1821)	2	6			
	Hesperiinae		*Xeniades orchamus orchamus* (Cramer, 1777)	1	14			
	Pyrginae	**Erynnini**	*Mylon maimon* (Fabricius, 1775) ♦	1			18	
			Gorgythion begga begga (Prittwitz, 1868)	2	1			
		Pyrgini	*Xenophanes tryxus* (Stoll, 1780)	2	1,14			
			Pyrgus orcus (Stoll, 1780)	7	1		18,19	
			Pyrgus oileus (Linnaeus, 1767)	10	1,6			
			Heliopetes arsalte (Linnaeus, 1758)	1			18	
			Heliopetes libra Evans, 1944	2		16		

Family	Subfamily	Tribe	Species	Abundance	Occurrence site (codes)			
					Bonito	Bodoquena	Jardim	Porto Murtinho
			Heliopetes omrina (Butler, 1870)	8	1	16	18	
			Antigonus nearchus (Latreille, [1817]) ♦	1		3		
			Antigonus erosus (Hübner, [1812])	3		16	18	
		Pyrrhopygini	*Elbella* sp. ♦	1			19	
			Myscelus amystis epigona Herrich-Schäffer, 1869	1			18	
Riodinidae (N = 14)	**Riodininae**		*Amarynthis meneria* (Cramer, 1776)	1	1			
			Barbicornis basilis Godart, [1824]	1	1			
			Catocyclotis aemulius (Fabricius, 1793) ♦	1	1			
			Chalodeta theodora (Felder & Felder, 1862)	1			18	
			Chamaelimnas briola meridionalis (Lathy, 1932) ♦	1	17			
			Emesis sp.	6	14	3,16	18	
			Hyphilaria thasus (Stoll, 1780)	2			18	
			Lasaia agesilas agesilas (Latreille, [1809])	1			18	
			Leucochimona icare (Hübner, [1819])	1	1			
			Notheme erota (Cramer, 1780)	2		5		
			Nymphidium leucosia (Hübner, [1806])	3	1			
			Rethus periander (Cramer, 1777)	2		16		
			Synargis bifasciata (Mengel,1902) ♦	1		16		
			Synargis calyce (Felder & Felder, 1862) ♦	1		16		
Lycaenidae (N = 6)			*Leptotes cassius* (Cramer, 1775)	5	1,14,17	16		
			Hemiargus hanno (Stoll, 1790)	8	6	16	18	
			Arawacus aetolus (Sulzer, 1776)	3	17	16		
			Strymon mulucha (Hewitson, 1867)	3	1,6		18	
			Strymon rufofusca (Hewitson, 1877)	1			18	
			Strymon ziba (Hewitson, 1868) ♦	1	14			
Pieridae (N = 12)	**Coliadinae**		*Eurema* sp.	26	4,6	15,16		
	Coliadinae		*Eurema elathea* (Cramer, 1777)	4	14		18	
	Coliadinae		*Anteos clorinde* (Godart, [1824])	2		16		

Family	Subfamily	Tribe	Species	Abundance	Occurrence site (codes)			
					Bonito	Bodoquena	Jardim	Porto Murtinho
	Pierinae	**Pierini**	*Ganyra phaloe endeis* (Godart, 1819) ♦	2		16		
	Coliadinae		*Aphrissa statira statira* (Cramer, 1777)	2		16		
	Coliadinae		*Itaballia demophile* (Linnaeus, 1763)	6		16		
	Pierinae	**Pierini**	*Glutophrissa drusilla* (Cramer, 1777)	4	9	3,16		
	Coliadinae		*Phoebis argante* (Fabricius, 1775)	8	6	16		
	Coliadinae		*Phoebis sennae* (Linnaeus, 1758)	2		16		
	Coliadinae		*Pyrisitia leuce* (Boisduval, 1836)	1		16		
	Coliadinae		*Pyrisitia nise* (Cramer, 1775)	3	9	3,5		
	Coliadinae		*Rhabdodryas trite* (Linnaeus, 1758)	1		16		